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Challenges in Refractometry: Troubleshooting Refraction Problems

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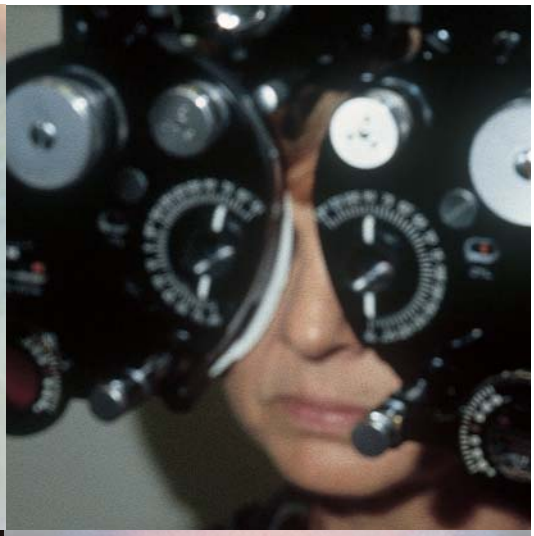

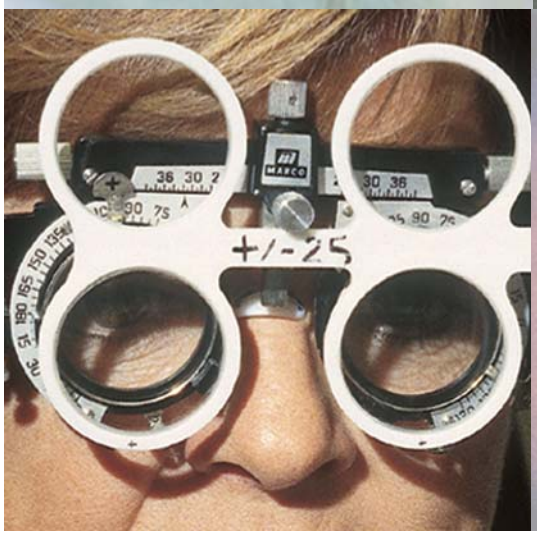

Module 0007

JCAHPO
JOINT COMMISSION ON ALLIED HEALTH PERSONNEL IN OPHTHALMOLOGY

Challenges in Refractometry:
Troubleshooting Refraction Problems

Table of Contents

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Introduction

Spectacle remakes necessitated by poor refractometry results can be frustrating and time consuming for patients and staff. This module focuses on educating ophthalmic allied health technicians on methods intended to reduce the number and expense of spectacle remakes. Case histories are used to illustrate how technical skills in refractometry can be improved to troubleshoot refraction problems, reduce chair time, and increase success in filling spectacle prescriptions.

Objectives

Upon completion of this module, the reader should be able to:

(1) list the sequence of steps in subjective refractometry.
(2) describe the cylinder axis test and the cylinder power test.
(3) explain the importance of a refractive history.
(4) describe common refractive problems faced by contact lens wearers.
(5) explain why knowledge of lifestyle is important when treating presbyopes.
(6) list questions that should be answered in effective spectacle problem-solving.

Patient's Perspective on Refraction

From a patient's perspective, the single most important part of a comprehensive medical eye examination is refraction, the component that helps them to see more clearly. Once their vision is sharp and clear, patients want to know if their eyes are otherwise normal; therefore, refractometry is an important skill for ophthalmic medical technicians, especially those working in a general ophthalmic practice.

Increasingly, refractometry is being performed by ophthalmic technical personnel, while ophthalmologists concentrate on other portions of the medical eye examination. Gaining refractometry skills requires detailed instruction plus practical experience. True proficiency in refractometry requires years of practice.

Subjective Refractometry Overview

Refractometry is a testing procedure that involves a number of ***sequential steps that must be followed every time, without shortcuts***. By completing the methods in "Steps to Successful Refractometry," (see the shaded sidebars on the next few pages), ophthalmic technicians can help significantly to reduce patient frustrations and costly spectacle remakes.
Reviewing a patient's chart, analyzing his or her refractive history, interviewing him or her and carefully listening to responses to your queries about lifestyle and subjective complaints are all important prerequisites to refractometry. When appropriate, using cycloplegic drops can also be of significant benefit.

Refractive Problem Cases

Did you compare the new refraction to previous vision examinations?

Refractive history is often overlooked. When a patient has been seen before, it is important that his or her refractive history be part of the total eye examination, and that past refractions be compared to the current one. The following case illustrates the importance of the refractive history.

Case 1

For several years, a 22-year-old woman wore glasses that were -3.25 sphere OU (both eyes). A more recent (non-cycloplegic) manifest refraction showed -4.50 sphere OU. When the woman presented for a new manifest refraction, she was given a -5.00 sphere OD and -5.25 sphere OS. **Stop**—that's a lot of additional minus power! Look at the patient's chart and ask yourself, "Was retinoscopy or automated refraction ever done on this patient? Was keratometry ever

Steps to Successful Refractometry

1. **Level the phoropter.** Using the bubble level on the phoropter, level the instrument with the floor, not with the tilt of the patient's head. If the patient has a head tilt, it may be best to use a trial frame and loose lenses for refractometry.

2. **Adjust the phoropter's interpupillary distance.** If more light is needed to see and center the patient's eyes, shine a penlight from the side, behind the phoropter, rather than directly into the oculars. This avoids dazzling the patient's vision.

3. **Occlude one eye using the auxiliary lens wheel.** Enter your starting point for sphere power, cylinder power, and cylinder axis on the phoropter. Refractometry has three possible starting points: auto refractor results, current spectacle prescription, and retinoscopy.

4. **Initial spherical adjustment.** The sphere power is adjusted utilizing first more plus sphere, and then more minus sphere—"sphere straddling"—to provide best acuity. Refine the spherical power by showing the patient lens choices that differ by +0.50 D and then by +0.25 D. Patients with poor acuity may need to be shown larger changes in power.
   Patients under the ages of 45 or 50 may accommodate during the refining process. This can lead to adding unnecessary minus to the refraction (over-minusing). Several steps can be used while refining the spherical power to help avoid overminusing:
   a. Offer sphere choices in the plus direction first. Give the patient the most plus (or least minus) that does not make his or her vision worse. This is called "pushing plus power."
   b. Ask the patient to choose the lens that makes the letters clearest, not smaller or darker, which is a sign of excess minus power.
   c. If the patient chooses additional minus (or less plus), you should check to see if each addition improves his or her ability to read the chart. Don't give the patient more minus if it does not improve acuity. If possible, give the patient the chance to improve to 20/15 or 20/10. A young person with 20/15 potential will probably not be happy with 20/20.
   d. If you are starting from a retinoscopy result, don't remove your working distance immediately. The "raw" retinoscopy, before the working distance adjustment is made, should be blurred. Remove the extra plus graduallly, stopping when the patient reports clear vision.

5. **Cylinder axis test.** Pivot the Jackson cross-cylinder into position, aligning the "pivot"/knurled knob with the current cylinder axis arrow; it will click into place. From this point on, when you move the cylinder axis, the cross-cylinder will move the same amount (except with Green's phoropters; with these, the cross-cylinder **(see page 4)**.

performed?" In this case, the answer was "no." However, when the same patient presented as a contact lens candidate four years later, keratometry yielded 1.00 D of corneal astigmatism in both eyes, and refractometry found -4.50 -0.75 x 15 OD and -4.50 -1.25 x 175 OS. Apparently, this patient had always been given the spherical equivalent of her actual refractive need and accepted less than 20/20 vision in each eye.

Lesson 1

When new patients come to your office, check their eyeglasses on the lensometer, but also use the automated refractor, streak retinoscope, or keratometer to determine if any astigmatism exists.

Does the refraction coincide with keratometric readings?

Keratometers measure orthogonal corneal astigmatism—that is, astigmatic meridians measured 90° apart from each other. If the total powers of the cornea are not 90° apart, it is often difficult to completely refract corneal astigmatism because powers of an ophthalmic spectacle lens are ground 90° apart and won't correspond to the nonperpendicular powers of the cornea. When recording keratometric (K) readings, always record each meridian of power separately—for example, 43.50@180/44.50@75 (a nonorthogonal reading) or 41.50@180/42.50@90 (an orthogonal reading). Knowing each meridian of corneal power is essential when comparing with follow-up keratometry.

Refractometrists should perform keratometry. It is a very useful tool. If it is difficult to use a retinoscope with a particular patient, or if you see a crisscross pattern (scissoring) in the retinoscopic reflex, you should use a keratometer. No matter what the case—a difficult refraction, a postoperative aphake or pseudoaphake, an early keratoconus patient, or a corneal transplant—use the keratometer to help determine the refractive astigmatism. Corneal astigmatism doesn't always equal refractive astigmatism. Over time, you will find more patients with lenticular astigmatism or nonorthogonal astigmatism than you ever thought possible, but you will learn to solve their vision dilemmas accurately with either spectacles or contact lenses, or with a combination of the two.

Case 2

A 33-year-old man was refracted as having simple myopia, with -3.00 OD and -4.50 OS. He purchased new glasses with this prescription from the optical center but found that now his vision was worse. The

patient noticed that, based on his previous eyeglass prescription, his "numbers were less than before." He wondered if ***that*** was why his vision was poor with his newly-purchased eyeglasses. The patient had been refracted three years earlier. At that time, the refraction showed -3.00 OD and -4.50 OS; a year later, he refracted at -3.25 OD and -5.00 OS.

Ultimately, a cycloplegic refraction was performed and he was found to be -3.50 OD and -5.25 OS. The change from his new glasses was -0.50 OD and -0.75 OS.

The clinic's cost to remake a single-vision pair of spectacle lenses is nominal, but when you add the extra chair time, the optician's time, and cost associated with the patient's "perception of error," simple mistakes like this can be quite costly for an ophthalmology practice.

Lesson 2

Review a patient's refractive history before providing a new prescription to ensure that the new one is as accurate as possible. Perform cycloplegic refractions on myopic patients under 40 years of age whenever possible. If not appropriate to use cycloplegia, instead use "fog" during refractometry and/or use the duochrome test (see step 8 on page 5).

Is the patient a contact lens wearer?

Special consideration must be given to the refractive status of contact lens wearers. Contact lens wearers with well-fitted gas-permeable or soft lenses should have a stable refraction. That is, the refraction will be similar before lens wear, after several hours of lens wear, or even a few days after discontinuing lens wear. However, a contact lens that is poorly fitted, warped, or has a compromised surface may alter the corneal contour and thus adversely affect the refraction.

Contact lenses can also induce refractive changes. Rigid gas-permeable lenses can warp easily, inducing corneal irregularity. The older, rigid lenses of polymethylmethacrylate (PMMA), even if well-fitted, can also adversely affect a patient's spectacle refraction, primarily due to the corneal hypoxia induced by the material's poor oxygen permeability. "Myopic creep," an increase in the myopic component of the refraction, can occur following soft contact lens wear. The inducement of irregular astigmatism, known as corneal molding, or an increase in regular astigmatism can occur following lens wear with either thick soft or rigid lenses; thus, corneal status, contact lens fit, and the refraction of contact lens

Steps to Successful Refractometry (continued)

must be moved manually). The cross-cylinder will cause a slight blur or distortion of the image—make sure the patient understands this. Also, let patients know you will be giving them two choices and ask them to choose the better of the two. One choice may be more blurred or distorted than the other, but neither choice will be sharp and clear. When checking the axis, say "Number 1," then pause before saying "Number 2," changing the lenses as you say it. When using a plus-cylinder phoropter, look for the position of the white dots. Once the patient makes a choice, place the cross-cylinder in the preferred position and rotate the axis toward the white dot position. This is known as "chasing the white dots." If you are using a minus-cylinder phoropter, you will reference the red dots on the cross-cylinder, and rotate the axis toward this position. This is known as "chasing the red dots." Continue to provide choices. Occasionally, changing the sequencing of the numbers is useful for confirmation. Go slowly—some lens choices may be difficult for the patient to appreciate. The cross-cylinder test endpoint is equal blur or equal image distortion. When this is achieved, you may continue to check the cylinder power.

6. **Cylinder power test.** Rotate the cross-cylinder so the "P" is now aligned with the cylinder axis arrow; it will again click into place. At this point, the axis will be aligned with either the red or white dots. Instruct the patient that there will again be two choices (both blurred and distorted). This time ask if "Number 3" or "Number 4" is better. Again, you must note the position of the dots.
   If the patient prefers the lens choice when the white dots are lined up on the cylinder axis, add plus power to the cylinder. Conversely, if the red dots are aligned, add minus power to the cylinder. Change the cylinder lens power 0.25 D at a time, depending on visual acuity. The goal at this point is equal blurring or equal distortion of the vision chart optotypes with each choice.
   If, while performing the cylinder power test, you change the cylinder power ±0.50 D or more, you must compensate by adding -0.25 D sphere power for every +0.50 D cylinder power added (or add +0.25 D for every -0.50 D cylinder power added) for either plus- or minus-cylinder phoropters, respectively.

7. **Carefully refine the sphere power when you com plete the cylinder axis and power checks.** Some prefer to perform this recheck on the second smallest line that the patient can comfortably read. For example, if best vision is 20/20, recheck on the 20/25 line. If no change is made, the refractometry is complete. If you have made a significant change to the sphere power, it may be prudent to recheck the cylinder. Check axis first, then cylinder power.
   While refining the sphere power, be aware of the patient's vision. Use ±0.25 sphere when acuity is 20/40 or better, and ±0.50 sphere when it is between 20/40 and 20/70. Lesser vision requires ±0.75 sphere or greater for the patient to be able to visually judge the clarity of the optotypes. Jackson cross-cylinders are available in different powers for this reason **(see page 5).**

Steps to Successful Refractometry (continued)

8. **Duochrome test.** To verify the spherical endpoint, use the duochrome test monocularly. The duochrome test is based on the eye not being corrected for chromatic aberration. It has nothing to do with color discrimination and works equally well for color-blind individuals. Commercially-available filters provide a separation of about 0.50 D in power from the red to the green; therefore, when the white light image is properly focused on the retina, the eye will be 0.25 D myopic for green and 0.25 D hyperopic for red, making the letters in the red and green fields of the chart equally blurred. If a patient's vision is worse than 20/30 (6/9) or 20/40 (6/12), the test will not be as useful because the 0.50 D difference between the two colors becomes difficult to distinguish. An eye with overactive accommodation will continue to require more minus power, and will not allow the red and green to be properly balanced.

   The objective of this test is to establish an end point of balance between the red and green optotypes on the chart. The refractionist adds—in 0.25 D increments—more plus sphere, or subtracts minus sphere when the green portion of the chart has clearer optotypes. Conversely, more minus or less plus sphere is added when the red portion of the chart has clearer optotypes.

   If used binocularly, you can check for binocular balance by alternately occluding one eye for comparison. You may prefer to use a 4.00 or 6.00 D base-down prism in front of one eye for simultaneous comparison when vision is equal. Use the 20/30 or 20/25 line if best vision is 20/20; the patient will see two vision chart lines, one on top of the other. This allows for an easy two-eye comparison of balance only when the patient has equal acuity. The technique can also be used to easily demonstrate unequal acuity.

9. **Use fogging technique for binocular balancing**. Have the patient open both eyes. Then add 0.75 D more plus sphere or less minus sphere to each sphere power for the patient's vision in each eye, so best vision is about 20/40. Using a hand-held occluder, cover first one eye and then the other, asking the patient which is better, or if they are equal. You may use a 4.00 or 6.00 D base-down prism in front of one eye and, with both eyes uncovered, the prism will separate the images vertically and make the two-eye comparison easier for the patient. Or, split the prism between both eyes with 3.00 D base-up over the right and 3.00 D base-down over the left. To make the two images equally blurred, you must blur the clearer image by adding plus, or clear the blurrier image by adding minus. Once the images are equally blurred, slowly remove the plus or add minus in 0.25 D steps (both eyes simultaneously) until the optimum vision is obtained. Often a patient will take a 0.25 D more plus or less minus when tested binocularly than when tested monocularly.

wearers must be checked periodically. Also, contact lens wearers must have a pair of glasses on hand in case a problem develops with their lenses.The following two cases illustrate some common problems encountered by contact lens wearers.

Case 3

A 45-year-old woman presents wearing hard (PMMA) contact lenses that she has worn for many years. Four years ago, the prescriber performed an over-refraction over the hard contacts and found plano OD and +0.50 sphere OS, providing 20/20 OU. The manifest refraction on that visit was -0.75 -0.75 x 15 OD and -4.00 -1.25 x 160 OS, both providing 20/20 acuity.

The current refraction shows +0.25 -2.00 x 15 OD, providing 20/30-2, and -3.75 -2.25 x 5 OS, providing 20/30. Over-refraction is +2.25 and plano, right to left. Look at the instability of the sphero-cylindrical refraction in both eyes and the over-refraction over the contacts. Her vision has dropped to 20/30 OU. On inspection, the contacts are not warped. This indicates that the corneas have been flattened. As a result, this patient required rehabilitation of her flattened corneas with gas permeable contact lenses and then refractometry for eyeglasses.

Lesson 3

When plus power over-refraction is present in a myopic rigid contact lens wearer, suspect corneal molding or lens warpage—or both. Always perform a thorough contact lens examination. Routinely perform keratometry. Check rigid contact lens base curves for warpage, and analyze the base curve/cornea relationship and contact lens versus refraction power before finalizing the prescription for eye glasses. Always look for best-corrected visual acuity changes with eyeglasses or contact lenses.

Case 4

A 48-year-old woman presents wearing soft lenses that are more than 4 years old. During this 4-year period, she has had two "complete" eye examinations—but without thorough contact lens evaluations. Eight years ago, a manifest refraction showed a sphere of -3.25 OD, providing 20/20, and -1.75 -0.75 x 95 OS, also yielding 20/20. The present refractometry provided 20/25 acuity OU, with 3.25 -1.00 x 95 and -1.50 -1.50 x 115, right to left. This is an example of old soft lenses warping corneas. In this case, the astigmatism was most likely induced by the older, less flexible soft contact lenses. The best recommendation for this patient would be to give her a new pair of daily wear disposable or planned

replacement soft lenses to wear for about 2 weeks at a reduced number of hours-per-day. At the return visit, a manifest refraction needs to be performed, as does keratometry—for comparison to previous records (if available). Serial corneal topographical mapping is a good tool, but may be unnecessary if the keratometry readings return to previous levels.

Lesson 4

Be attentive to refractive history with all types of contact lens wearers. A simple myopic shift is common with daily-wear soft lenses that are thick, dry, old, or simply not supplying the cornea with enough oxygen. Refractive changes are more common with thicker soft lenses, such as torics, and with patients who sleep with lenses on extended-wear schedules. Sometimes, induced myopia and astigmatism can be transient, depending on the duration of the condition.

If you are missing a portion of the refractive history, don't hesitate to contact a previous practitioner to complete the history. Patients will appreciate thoroughness and follow-through.

Patient Education for Presbyopes

This year, someone will turn 50 years of age every 7.5 seconds. Each year, the number of adults who develop presbyopia is enormous. Presbyopes often want their eyes to perform as they did 20 years ago—perfectly. Most presbyopes don't understand the vision adjustments and problems they now face.

Many clinics fall short in educating pre-presbyopic and presbyopic patients. All presbyopes want information about the changes their eyes are undergoing. They need realistic information about what they can expect from a new eyeglass prescription.

If an ophthalmic technician spends time listening to the patient describe his or her visual needs, and properly explains the accommodative process, the entire refractometry procedure is better understood, and the patient's near-vision concerns are minimized. You might call this communication process "lifestyle refractometry." Much as opticians perform "lifestyle dispensing," so too, must ophthalmic technicians identify the patient's vocational vision requirements, as well as his or her hobbies, home computer use, involvement with sports, and so on. By determining a patient's visual requirements for both work and home, you can properly assess the patient's intermediate- and near-vision requirements.

Near-Vision Problem Cases

Does the new refraction make sense considering the person's age?

Case 5

A 42-year-old accountant was complaining of near-vision problems. The prescription issued was -0.50 -0.75 x 80 OD, providing 20/25, and -0.25 -1.25 x 110 OS, providing 20/20. He returned several weeks later complaining that he still could not read, even with his new eyeglasses. His refraction was rechecked and another prescription issued as -0.75 -0.75 x 90 OD and -0.75 -1.00 x 110 OS. Stop right here. Let's see what happened. The patient reads all day, each day at work (he's an accountant) and he is myopic and newly presbyopic. The second prescription was more myopic. Does that make sense? Most likely, no one ever took the time to check his near point. Here is what made him most happy:
-0.75 -0.75 x 80 OD and -1.00 -1.00 x 105 OS. He required a +1.00 add OU for his presbyopia.

Lesson 5

Once again, we see the need for the ophthalmic technical staff to invest time assessing and recording the patient's visual complaints during the history-taking process. The patient in the case above complained of near-vision problems. But this complaint was not addressed. He was given a myopic distance prescription that *may* have improved his distance vision but made his struggle to see items close-up even greater.

We can't hope to satisfy our patients if we don't address their specific vision problems. These may include problems with distance vision, near-vision, trouble seeing a computer screen, or the need to see clearly at a specific distance. This exchange of information is invaluable in providing the best refractometry examination.

You should check the need for additional plus for near-vision (called a "reading add") on all potential presbyopes. Do not be fooled if the patient's near-vision is 20/20 without an add. The patient may be able to clear his/her near-vision for a short time, but have problems reading for a prolonged period without assistance.

The Prince Rule (Figure 1) measures accommodative amplitudes and the near point of accommodation. It can be used to assess the near-vision and required near add of all patients over 35 years of age with a minimal investment in chair time. The simplest technique for doing this is the "push-up" method.

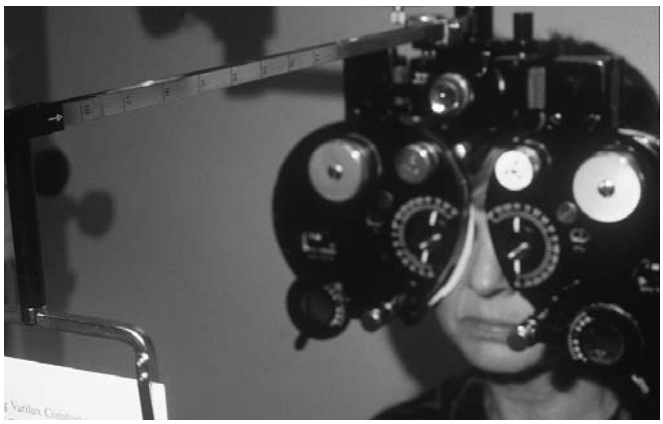

Figure 1. Patient and Prince Rule.

With the push-up method, first add +3.00 D sphere to the distance prescription; then, with the reading card at 35 cm or more, ask the patient to read the 6-point type. Move the card slowly forward or away from the patient to clear the type. Then move the card toward the patient until it blurs, and note the dioptric value engraved on the Prince Rule. Subtract +3.00 from this dioptric value; the remainder is the patient's binocular amplitude of accommodation.

To determine how much additional plus the patient will need to read comfortably, we must first know what reading distance the patient prefers. If, for example, the preferred reading distance is 33 cm from the eyes, a total of +3.00 is required. Half of the patient's accommodative amplitude can be used comfortably for prolonged reading. If the patient's total amplitudes are 4.00 D, then 2.00 D are easily available. If 3.00 D are needed and 2.00 D are available, then the remaining 1.00 D will need to be provided in a reading add.

Another method involves using the Prince Rule to find the near add that will place the patient's preferred reading distance comfortably in the middle of the accommodative range. First, determine where the patient prefers to hold reading materials, and place the reading card at this distance on the Prince Rule. Place an estimated near refraction in the phoropter (such as the distance refraction plus +2.50).

Add minus until the patient's vision begins to blur. Next, add plus, counting clicks as you go, until the vision again blurs. The best near refraction is the center of this range. For example, with the reading card at 33 cm, the patient sees clearly between -4.00 D sphere and -1.00 D sphere. The total range is +3.00 D. Half of this range is +1.50 D. This +1.50 D is added to -4.00 D to get the final near refraction of -2.50 D sphere.

Case 6

During the near-vision examination, a 50-year-old woman with hyperopia required a +2.50 add power. She was eventually given this prescription: +0.75 -0.50 x 95 A +2.50 OD and +1.00 -0.25 x 85 A +2.50 OS. When the optician dispensed her glasses, she was very happy with the near acuity, but found her distance vision blurry. The optician had initially questioned the +2.50 add. The patient was rechecked and was given +1.50 -0.50 x 95 A +1.75 OD and +1.75 -0.25 x 85 A +1.75 OS. This add power made more sense considering her age.

Use the simple "tool" of calculating the near-vision only (NVO) prescription to compare changes made in near refractometry. The near add is added to the spherical portion of the distance prescription. The cylinder power remains the same. In this case, the effective power of both prescriptions for near was identical at +3.25 -0.50 x 95 A, and +3.50 -0.25 x 85 A, right to left.

Lesson 6

Does the add power make sense considering the person's age?

The rule of thumb, "+1.50 at 50," can be used for a gross comparison. Some patients take more add while others take less, depending on their preferred reading distance and accommodative ability. When measuring near acuity, note where the patient holds the card to read it.

Also, ask the patient at what distance he or she feels most comfortable reading. In this case, a +2.50 add for a 50-year-old just doesn't make sense.

Calculating a near-vision only prescription is a simple way to determine if you have effectively changed the near power. Use this technique often. When patients want more add power, never increase it by more than +0.50 D, and preferably by no more than +0.25 D.

Have you considered the patient's profession, hobbies, and everyday visual tasks?

Have an open discussion with your patients. Ask them about their daily visual tasks. To provide them with the best functioning eyewear prescription, you need to know how they use their eyes during the day at work and at home.

If a presbyopic patient works at a computer 8 hours a day, a special pair of occupational glasses might be appropriate. The patient might use progressive addi-

tion lenses for dress wear and purchase the special glasses for work. Certain professions may also have special vision needs. For example, a house painter with presbyopia may feel uncomfortable tilting his head back while standing on a ladder. Yet he may need to do just that in order to look through the trifocal or bifocal segment of his glasses. This person requires occupational multifocal lenses that enable him or her to look intermediately in superior gaze. Many patients with presbyopia have special vision needs—hairstylists, choir directors, organists, car mechanics, to name a few. Be sure to discuss various lens options with these patients.

Case 7

A 53-year-old wheelchair-bound man had a history of three refractions over the last five years, all three showing a similar axis: -2.50 -0.75 x 175 OD and -3.50 -1.50 x 170 OS. During a new examination, the eyeglasses were incorrectly recorded as -2.50 -0.50 x 83 A +2.75 OD and -2.25 -0.75 x 70 A +2.75 OS. The patient was given a prescription for -2.00 -0.50 x 85 A +2.50 OD and -2.00 -0.75 x 70 A +2.50 OS. When the patient returned for an eyeglass check complaining that he couldn't read at his desk while seated in his wheelchair, the prescription wasn't rechecked, but the add was reduced to +2.00 OU, and it was recommended that he try progressive addition lenses or a flat-top bifocal segment to accommodate his longer reading distance. When his near-vision did not improve, the patient returned for a second eyeglass check. At this time, the distance refraction was checked and the problem was discovered—the cylinder had been prescribed at the wrong axis. The patient complained about the errors and requested a refund for the multiple pairs of unusable eyeglasses he had purchased.

A lensometry mistake and less-than-careful refractometry cost the practice excessive chair time for two eyeglass checks, multiple phone calls, a refund to the patient for glasses purchased elsewhere, and probably loss of the patient to another office.

Lesson 7

The incorrect recording of a patient's current spectacle prescription can be a pre-examination error. We should not assume that the patient is wearing the prescription that was given at the last visit or that the present glasses have been recorded correctly during lensometry. **Do not assume.** Take the time to perform accurate lensometry.

When a patient returns for an eyeglass check complaining of a vision problem, redo the refractometry for distance and near. In this case, the add power was reduced in an attempt to accommodate the patient's longer reading distance; unfortunately, it only compounded the problem. The refraction was incorrect from the start.

Case 8

A 44-year-old relatively lanky engineering professor with an arthritic neck holds his reading materials in his lap; he suffers from migraines and has never worn bifocals. He has complained of near-vision problems for about two months. His spectacles were recorded as -7.75 -1.00 x 105 OD and -7.50 -0.50 x 80 OS, and he was issued a prescription of -9.25 -0.50 x 115 A +1.50 OD and -8.75 -0.50 x 90 A +1.50 OS. After phone calls with the angry patient, during which he complained that "no one ever asked me where I liked to read my technical journals," he was re-examined for near-vision and was given +0.75 add over his distance correction. A trial frame was used to assess and satisfy this patient's special near-vision requirements.

Lesson 8

Do not assume that all patients want to read at 14-16 inches. Tall people with long arms often read in their laps. This patient also had an arthritic neck, which made it even more uncomfortable for him to read closer.

Use of a trial frame and trial lenses to check reading vision is especially appropriate for patients who are tall and have long arms. First, be sure the distance-vision prescription is balanced; then, load the distance prescription into the trial frame and adjust to

Figure 2. Patient with trial frame and +0.25 lens flipper for near-vision.

the patient's face, with correct pupillary distance and pantoscopic angle. Have the patient attempt to read as you prepare the lenses for the add power; this stimulates accommodation without an add power. Change the add power by using both hands to change lenses simultaneously, or use a ±0.25 lens flipper (see Figure 2).

Do not give all new 40-plus patients a +1.50 add as a bifocal starter. Recall that the rule of thumb is usually +1.50 at 50 years of age. The chart below shows the range of clear near-vision at various ages and the required add powers.

The amount of the bifocal reading add should be equal for each eye as long as neither eye has a disease that limits accommodation, neither eye is being medicated with miotics or cycloplegics, and neither eye has an optical aberration (such as cataract or central corneal scar) that influences the reading position.

Age	Add	Blur In	Blur Out
42	+0.75	8.5"	32"
46	+1.00	9.5"	28"
50	+1.50	10.5"	25"
54	+1.75	11.0"	22"
58	+2.00	11.25"	20"
62	+2.25	11.5"	18"

Analysis of the Dissatisfied Spectacle Patient

It's best to develop a plan for dissatisfied refractive patients. First, be sure your receptionist is knowledgeable of policies for handling these patients. Telephone scripts for receptionists work well and should be written concisely to reflect the policies of your office. For the refractionist, the first step is to determine if the glasses have been worn unsuccessfully for a period of time. The next step is to verify the patient's eyeglass prescription with a lensometer. Analyzing the problems of dissatisfied spectacle wearers can be facilitated by categorizing complaints. The following lists of questions should help in problem solving. Before a refraction recheck is warranted, determine if a patient's symptoms are truly refractive or an eyewear problem.

For vision complaints ask:

Do you have distance-, intermediate-, or near-vision problems?
Can you explain the vision problem more precisely?

Assessment for distance problems:

- Have you checked the chart for a written prescription transposition error?
- Is the distance prescription correct?
- Is the patient a contact lens wearer with blur afterlens wear?
- Is the change in refraction transient? Does the patient have diabetes?
- Is there a vertex distance concern? With powers of 10 greater than +6.00 D, errors in vertex distance can change the refractive power of the lens.

Assessment for intermediate and near problems:

- Does the patient understand the purpose of multifocals?
- Was the add correct for the patient's age and visual tasks?
- Does the patient have special occupational needs?
- Is the patient complaining about the multifocal style? Segment height?
- Is the patient a half-eye candidate (that is, a candidate for Ben Franklin–type reading glasses)?
- Does the patient need progressive addition lenses?
- Is there anisometropia? Does the patient need separate distance and near glasses?
- Does the complaint indicate a possible convergence insufficiency problem (headaches and blurring after approximately 15 minutes of near work)?

Obtaining the answer to these questions can help you determine if the patient needs his or her refraction reassessed or possibly needs to adapt to the lenses or have the frame adjusted.

The optician or optical staff can further evaluate whether:

- A change in lens material might lessen aberration.
- An aspheric lens is required.
- A base curve problem exists.
- The frame is causing lens warpage.
- The lens has surface irregularities.
- The prescription shows a transposition error.
- The right lens was interchanged with the left lens.
- The vertex distance was corrected appropriately.
- The frame is too shallow or a poor shape for progressive addition lenses.

- The multifocal fitting height is correct.
- The frame needs more pantoscopic angle.

For cosmetic or physical complaints:
The following concerns—although not pertaining to the refraction—are nonetheless important and are within the optician's domain. If these and other minor visual problems are mentioned during the patient interview, you may consider having the optician find the source of these complaints, especially if the major problem is the eyewear.

- My spouse dislikes my new frame style.
- The glasses don't match my complexion/wardrobe.
- The frame fits poorly. It hurts my nose/ears.
- The frame is too large (or too small).
- The edges of the lenses are too thick.
- The new eyeglasses are too heavy.
- The tint is too dark (or) the coating is difficult to keep clean.

Summary

As more and more ophthalmologists engage in optical dispensing, it becomes increasingly important for ophthalmic staff to ensure that initial refractions are as accurate as possible. Remakes are costly—not only financially, but in terms of additional staff time. Consistency in refracting, as well as a systematic approach to resolving patients' visual complaints, is the key to avoiding costly remakes. Try to intercept refractometry problems *before* the eyewear prescription is written.

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